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Combat Crew

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Combat Crew

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On Our Cover

A boom operator's view of refueling a KC-10 can be summed up in two words: It's BIG. For more on refueling a KC-10, see page 4.

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General Thomas S. Power
Commander in Chief, Strategic Air Command
July 1957 — November 1964

General Power's editorial first appeared in Combat Crew in August 1963. His words are just as true today as they were 20 years ago. History has confirmed his wisdom, foresight and leadership. The "rut" which he set then became the basis for today's SAC minimum of 100%.

. . . I could not help reflecting on the permanence of superior performance. It is one thing to achieve superiority in any endeavor; it is quite another thing — and perhaps still more difficult — to maintain such superiority consistently.

We tend to judge an individual or team by some spectacular achievement, though short-lived peak performance is, at best, merely an indication or a matter of luck. The real value of man or unit, however, must be gauged by the overall level of performance over an

THE MOST DANGEROUS ROAD ... THE RUT!

extended period of time. The higher that level is the more difficult it becomes to maintain because superior performance can easily lose its challenge once it has turned into a habit.

The point is that getting into a rut breeds complacency even if that rut means being consistently outstanding and better than almost anyone else. For instance there are the perplexing cases of highly skilled and experienced pilots who commit inexcusable errors leading to serious accidents. As a rule these men have lost none of their skill nor have they grown exactly careless and overconfident. They are merely in a rut and have become so accustomed to their proficiency that they take it for granted. A similar explanation often applies to disappointing performances by champion athletes or sport teams and for that matter by outstanding individuals and groups in any line of endeavor. In other words, it is human nature to grow complacent when the challenge is gone.

I am bringing this subject up because one might think that it could pose some problems to us in SAC. A case in point is our ground alert system. We started that system in the fall of 1957 with a small percentage of our strike forces. Through continuous refinements we gradually expanded the alert to one-third and eventually to about one-half of the force, with time of reaction reduced to less than the warning time we can expect to get from the BMEWS in case of a missile surprise attack.

Never before in military history has such a high percentage of a large combat force been kept on around-the-clock instant alert during peacetime. We achieved this seemingly unattainable goal, with little increase in personnel and materiel, not only through many radical changes in military management and techniques, but primarily because of the unsurpassed professionalism and dedication of our combat crews and support personnel. They were given a challenge which they realized was worth every sacrifice and they met that challenge.

We have maintained this high state of readiness for some time now. It has become a way of life with our crews, a tough and demanding way of life, to be sure, but accepted by them as their part in a mission whose success may spell the difference between honorable peace and nuclear holocaust, between the nation's survival and defeat. Alert tours, practice alerts, inspections, training — all this has become a routine; indeed, even the unparalleled standards expected of our men have become routine.

I am often asked how long SAC and its men can keep up this grueling pace. A boxer who has trained to the sharpness of a razor's edge can maintain this condition for a day or two at most. Yet our men must remain in a state of complete combat readiness day in and day out for years on end. The question, therefore, is whether there is any danger that their duties, however exacting, may become a routine without challenge and a rut dulling their spirit.

I do not share this concern. My answer is that every day brings a new challenge, namely, the challenge to add one more day of peace to an era that historians of the future may consider the most critical in our nation's existence.

The threat keeps changing and growing and SAC's men know that they must change and grow with the threat. That affords no room for complacency, no chance for routine, no place for a rut. Putting it differently, we in SAC never accept today's perfection as the ultimate but only as a step toward tomorrow's perfection.

Therein, I believe, lies the secret of SAC's continuing success as the Free World's most convincing deterrent to nuclear aggression and the promise that it can and will accomplish its mission indefinitely. And that is the only "rut" which SAC will accept.★★★★

Refueling

Capt Brad Jones
9 AREFS, March AFB

You walked into the scheduling office and told them you were getting bored with the same old refueling mission. They, in their usual polite manner, told you that you were in luck and they just had a KC-10 refueling mission come through and they'd put you down for it. Oh, and by the way, they also had this extra SOF tour . . . Well, that'll be the last time you walk into scheduling for awhile, but now how do you refuel with the "10" anyway? What kind of capabilities and differences do they have in their equipment? Are there any differences in rendezvous procedures? What's it like, precontact and contact? Are there any differences in emergency procedures with them? I'll try to answer these questions for you in the ensuing paragraphs. Receiver and tanker procedures will be separated as much as possible.

First off, I know those Gucci boys have got a bunch of neat stuff up front, but what all do they have? Well, the KC-10 is equipped with dual HF, UHF, VHF, ADF and TACAN. It's also got a Bendix Multifunctional digital color radar, triple INS, I and J band beacons (NOT APN-69), boom interphone, and has a boom offload capability of 9,600 ppm (which is usually restricted by the receiver's plumbing.) One of the TACANs will work as a flying TACAN station giving the other aircraft bearing and distance to the KC-10 (and also erroneously updating your DNS.) The standard TACAN will receive and display this data (although the bearing will occasionally waiver like ADF). The KC-10's dual autopilots are the standard commercial ones and are restricted to 25° of bank in the automatic mode so the turn range and offset charts have been recomputed to reflect the wider turn radius.

KC-10 as Tanker

In addition to the wider turn, when the KC-10 is acting in the tanker role, it has certain other idiosyncracies. The KC-10 offsets from the ARIP-ARCP track as determined from the INS. (Normally the INS precession rate is less than ½ NM per hour, so that's going to be a pretty reliable position.) His primary means for the rendezvous are the INS for offset and the TACAN for turn range. The receiver still calls ranges using air to air TACAN or radar as a backup. Alternate means, listed in order of priority are: Receiver rendezvous beacon, UHF/DF, ARTCC or GCI, common ground TACAN, timing or visual. Final closure airspeed schedules may differ from the KC-135, so check your air refueling manual. In all cases it is extremely important that the receiver maintain the IP-CP track. The "10" has the capability to adjust the track for weather if needed, but under normal conditions his assumption is that you are flying the IP-CP track.

Now that you are within ½ mile behind the KC-10, what other differences are there? It's BIG. The "10" leaves the air to air TACAN on until contact so that receivers can coax themselves in, but it still looks almost twice the size of a KC-135 and some receivers tend to park out in the "back 40." Sighting through the tip of the boom to the nose gives a good visual reference for a 30° incline to

with the KC-10

the precontact position. At about 200 feet prior to precontact, you'll be able to see two drain masts and a thin UHF/VHF antenna. Placing the longer of the two drain masts (the UARSSI drain mast) on the nose of the aircraft will give excellent elevation references. The fore and aft reference will vary with the aircraft you're flying. A discussion with a KC-10 qualified IP will give you the precise references for your aircraft. At about 100 feet, you'll reach the KC-10's downwash and it may require slightly more power to get to precontact.

After being cleared into the contact position, your power adjustments should be normal. If you fly a heavy, you may prefer to approach-up the 30° incline as opposed to the flat approach. Some receivers have reported a noticeable rudder buffet on the flat approach. The boom operator likes you to fly the 30° incline approach because he gets constant visual references and it allows him to keep your receptacle in constant view. The lighting signals remain the same, except that the boom can signal for horizontal and vertical movement simultaneously. You may hear a louder than normal rushing noise as the boom is plugged in. Once contact has been made, you'll find the envelope is enormous. The boom control computer takes over to eliminate applied stress to the boom during contact. The computer doesn't know your expertise at last minute salvage jobs and will punch you off if your rate towards a limit is excessive. The PDI lights anticipate movement out of the green and give intermittent (flashing) corrections back to green. The rest of the normal AR procedures remain the same as with the KC-135.

The KC-10 still looks almost twice the size of a KC-135 and some receivers tend to park out in the "back 40."

The breakaway procedures are the same as with a KC-135, but the KC-10 has some additional abnormal/emergency procedures during AR. They are the boom control unit shutdown (BCU Shutdown), pressure refueling, and inability to achieve disconnect.

During air refueling, the boom control unit (the computer actually flying the boom) could fail. It is designed to be a passive failure, with all control surfaces remaining in the last known position. If any malfunctions occur, follow the boom operator's instructions explicitly. Do not initiate a disconnect. The boom operator will direct the receiver to a safe position for disconnect.

Pressure refueling can be accomplished if a fuel emergency exists when all other means to affect a contact fail. After a contact is established, a power increase will probably be required to prevent the receiver from being pushed beyond the outer limit. Reduce power immediately to prevent overrun if an inadvertent disconnect occurs.

If the receiver does not have disconnect capability, the refueling can be continued because the KC-10 has an independent disconnect system (IDS). The system, independent of the aircraft, pneumatically retracts the latches that the receivers toggles are locked onto.

KC-10 as Receiver

When the KC-10 is the receiver, it flies inbound on the ARIP to ARCP track. If the course change between the track to the IP and the IP-CP track is excessive, the KC-10 may overshoot the inbound track initially, but will correct back immediately. The APN-78 beacon representation can vary from 4-12 miles in length and .25″ in width depending on the Flip beacon code. The rest of the rendezvous is conducted as per tech order.

Behind the KC-135, he's still going to look BIG, and he'll have some other quirks. If it's night and the KC-10 has his lights on, he can look like a city. Those lights have dimming controls, so if they're too bright, ask him to turn them down. Also for use at night are the UARSSI flood lights. They open up outside the receptacle for added illumination. Air flow is somewhat more turbulent near the receptacle on either side of

Refueling the KC-10

centerline, so boom stability may diminish as azimuth increases. Like the C-5, the KC-10 will push the KC-135 around a little, and it may require the tanker pilot flying to assist the autopilot. As the KC-10 approaches, the bow wave will be pushing the tail of the 135 up, so back pressure on the yoke may be required to help maintain straight and level. Applying some forward pressure when the "10" backs out will help as well. Breakaways will necessitate some forward pressure to maintain straight and level until horizontal separation is achieved and then vertical separation will be obtained.

The three main things to remember when refueling the KC-10 are that the KC-10's beacon is not an APN-69, the TACAN gives bearing and DME to the KC-10, and the rendezvous is affected with relation to ARIP-ARCP track. The KC-10 beacon presentation on the KC-135 scope is two blips separated by 4-12 miles. The TACAN bearing may waiver somewhat like the ADF, but it gives direction to the KC-10. Remember also that the KC-10 crew assumes that the receiver is flying the IP-CP track from the ARIP to ARCP. Keeping this information in mind with the rest of your expert knowledge just might make refueling with the KC-10 fun, and you might wander back into scheduling again to ask for another . . . SOF tour?

DESCENTS . . .
The Easy Way

Maj Ron Sams
CFIC, Castle AFB

Many pilots make descents harder than they have to be. In order to arrive at the proper altitude following an enroute descent or a published penetration, most pilots have been taught to perform a subtle and cerebral form of mathematics.

For example, suppose the aircraft has been cleared to 1000 feet from FL 210. The pilot calculates that 20,000 feet must be lost. So far, that's easy. Next the power is reduced, and the aircraft's nose is lowered to begin a descent. When the descent is stabilized, the pilot must now figure out if the descent rate is sufficient. This is where the problem becomes complicated, so I'll use round numbers in this example.

The airplane is traveling at .7 Mach, which translates to seven miles per minute, and it's 70 miles to the airport. By dividing seven miles per minute into 70 miles, the pilot figures it will take 10 minutes to get there. Next, the pilot checks the VVI, which indicates a descent of 1000 feet per minute. In 10 minutes (multiplying 10 times 1000 feet per minute) the airplane will lose 10,000 feet. Since 20,000 feet must be lost, the pilot knows that the current descent rate is not steep enough, so the nose is lowered further to increase the VVI. Then the computations start all over again.

Using the above technique, descents are a continuous math problem. Miles per minute is divided into distance remaining, to get time to the destination or level-off point. Then time is multiplied by the current VVI rate to compute a projected altitude loss, which is compared with the altitude loss required. (Anybody confused?)

It's very difficult to use this technique while concentrating on the instruments, completing checklist items, answering radio calls, etc. Though I once had a student who could fly and mentally compute the sine and cosine of angles to determine crosswinds, he was the exception to the rule. When you load someone's senses with the physical and mental stresses of flying an airplane, the brain cramps and refuses to add and subtract, especially during periods of high activity.

Besides the math, the problem with this technique is that "performance" instruments, such as VVI and Mach number, in effect become the pilot's "control" instruments. The pilot uses the VVI as the primary means to determine if the descent *rate* is adequate. If the rate is inadequate, the nose is lowered to increase the descent rate on the VVI. This makes the pilot a slave to the VVI, and causes him/her to be confused about what's really important to insure a successful descent.

It doesn't matter whether the descent began from the edge of the atmosphere in the space shuttle or from 16,000 feet in a KC-135. The problem is always the same. The pilot must lose a given amount of altitude in a given ground distance. That's descent gradient and has nothing to do with descent rate. Feet per minute does not and never will equate to feet per mile.

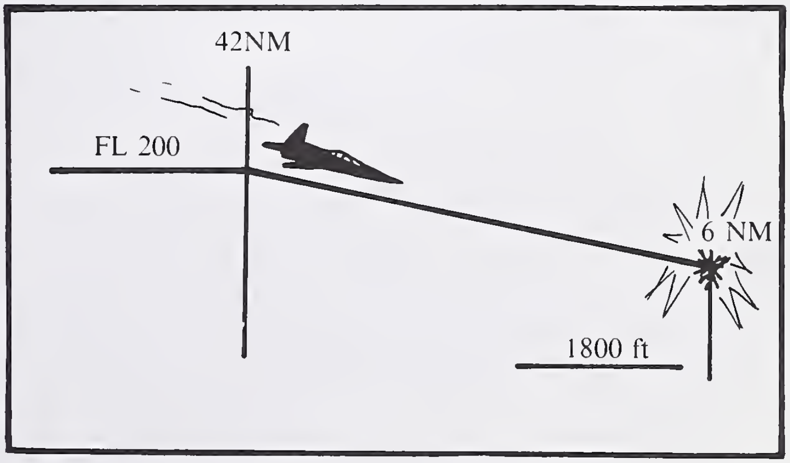
In order to illustrate the point, let's review a typical descent problem. The airplane must descend from FL 200 to 1800 feet in 36 MN. (See Figure)

If you spin this problem on the flight computer, (AFM 51-37, pg 3-7 has an example) you'll see that a descent gradient of 500 feet per NM is required so a five degree pitch change will be made.

The pilot who religiously believes in VVI will multiply the target pitch change by the Mach number to compute a descent rate. If you assume the aircraft was flying at .4 Mach when the descent began, the VVI pilot will look for a descent rate of 2000 feet per minute.

Unfortunately, the 2000 feet per minute quickly becomes a useless number. Because the true airspeed is

Cont'd on page 24



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Future Wars

1Lt Michael J. Petersen
740 SMS, Minot AFB

A century ago, warfare teetered on the edge of being transformed by the industrial revolution. Iron had replaced the stout oak sides of wooden ships and railroads were fast becoming the way to move troops into battle. Jets, ballistic missiles and space shuttles were not yet even on the drawing boards. In 1983, warfare is again on the verge of another transformation, this time by the technological revolution. Space flight has been accepted and the ideas of space stations and industries in orbit have come within mankind's grasp thanks to the success of the space shuttle. Can we envision the nature of warfare by 2084 any more successfully than Karl Von Clausewitz could envision technological marvels of the modern battlefield?

War 20 years from now borders on science fiction. Warfare a century into the future is science fiction. Technology has always proved to be the yeast in the formulation of new strategies and tactics. The development of artillery doomed the previously impregnable fortress of Constantinople, which fell in only 40 days of bombardment after withstanding a millenium of onslaughts. Repeating firearms and breechloading cannon ruined the glory of cavalry charges at Balaklava and elsewhere. Tanks and dive bombers led the way for development of the Blitzkreig and the Maginot Line was by-passed. Small antitank rockets may be dooming the tank to the fate of the mounted knight on today's battlefields. Thus each technological advancement has irrevocably altered the face of warfare. So the idea that we may in 2084 be fighting Star Wars style battles in the remote vastness of space is not quite so farfetched as first imagined; especially if the pace of advancement of the last century is projected into the next.

Then what of warfare in 2084? What can we possibly predict? The weapons of war are admittedly well into the realm of science fiction; however, weapons do not yet make war, men do. And where men make war, they must have commanders to lead, direct and develop the strategies that spell success or failure.

Of this future commander, what can we possibly predict? Will he be any different than the commander of today or 1884? Most emphatically no! He will have the same problems of morale, leadership, strategy and professionalism that have always plagued commanders. Our future Patton will still be leading men, whether in peace or war, or on land or in space. War will likely have moved out among the stars and a future commander may direct battles on moons, planets or starships, but he is well advised to recall the words of George Santayana: "Those who cannot remember the past are condemned to repeat it." Even with the weapons of a century from now, the commander will need to pay careful attention not only to the writings of his contemporaries, but also to the dusty pages of the past. Jomini, Sun Tzu, Clausewitz, Frederick the Great, Napoleon, Patton and other great commanders have already wrestled with similar problems and developed solutions. If he does not steep himself in these ancient treatises on the art of war, he will discover, perhaps fatally, those same mistakes made by the defeated throughout history. These writings will be as valid in a hundred years as they are today.

Consider for a moment the concept of seizing the high ground and forcing your opponent to struggle up to your level before he can give battle. This strategy is as valid today as it was yesterday and will be tomorrow. Today's high ground may not exist on earth. Two applications of the concept are the LaGrange points of the earth's orbit and secondly, anywhere on the side of the earth's gravity well. Occupying either of these points allows even a rock to become a deadly missile to anyone attempting to struggle up the gravity well from earth. So although technology has changed from a man on a hill with a rock, to a man in a space vehicle with a rock, the basics have still remained the same. However, a word of warning to our future commander: do not mistakenly attempt an exact duplication of a situation because this will likely prove to be just as fatal as ignoring the past.

Thus, warfare in the 21st Century will be very much like war in the 19th and 20th centuries. The weapons will have changed, but the techniques of command will remain the same. A commander a century from now will have added another dimension of this conflict like the air was added during WWI, but he will face the same problems of command his predecessors have. And just like the commander of today, he must study his profession of arms if he has any hope of success.

ATC . . . A Heady Bit of Work

Close your eyes. Imagine rolling into more than a 30 degree bank turn or pulling some G's while doing a split "S." Just a daydream to help pass time while relaxing on alert or flying a boring NAV leg? It doesn't have to be. ATC may have the answer.

Each year SAC selects 50 pilots each from the tanker and bomber fleets for ATC IP duty. The command prefers to fill these slots with volunteers working one on one with their resource managers. That doesn't always happen and nonvolunteers are selected. In some cases the nonvolunteers are very dissatisfied and approach the assignment with a pretty negative attitude.

Sure, we've all heard the rumors about ATC — the hours are too long; too many additional duties; paperwork will bury you; and most important, by the time you get back to SAC, your contemporaries will have the jump on you.

In this article we'll try to take an honest look at some of the objections raised and the pros and cons of an ATC assignment. Hopefully, we can provide a new perspective. Who knows? Some of you out there may have been overlooking a rewarding opportunity.

Currently, IPs in ATC are working 10 hour days but IP manning is approaching 100% and a manpower study is addressing the length of the duty day. Weekends are mostly free and there are no alerts. That's a far cry from the 12 hours a day, six days a week duty you've heard about.

Yeah, there are additional duties. Face it, additional duties are a fact of Air Force life. But, SAC pilots in ATC have a distinct advantage over the high percentage of FAIPs since they tend to progress into supervisory positions much quicker. Becoming a flight commander in ATC is probably one of the best leadership opportunities in the Air Force. And sure there is paperwork, but paperwork is what keeps the Air Force running, no matter where you are stationed or which command you're in.

It is also true that after four years in ATC you may appear to return to SAC behind your contemporaries. It will probably take you a short while to upgrade to IP while those who were copilots with you will already be instructors. But you will likely have more flying time and have gotten more valuable experience as a supervisor than those who stayed in SAC. That can make you much more competitive as a pilot and staff officer.

What then are the positive aspects — what does ATC have going for it? Plenty. First is challenge. PIT is tough; it has to be. After PIT you're on your own except for your buddy IP. PIT prepares you for those initial months as an IP. Not being prepared for student errors would be downright hazardous.

The biggest plus, however, is job satisfaction. There are a lot of personal rewards in serving as an IP in ATC. Sure, a student may occasionally try to ruin your day. But those days are far outnumbered by the rewarding ones. There are no words to express the feelings of pride and accomplishment you experience when stepping out on an initial solo or pinning wings on a new pilot who owes the majority of his piloting secrets to you. You are training those pilots who will shape the Air Force in the future. That's a heady bit of work.

And while reaping those personal rewards you're getting to do what most pilots live for — to fly. If you've ever had trouble getting flying time in SAC, ATC will certainly remedy the situation.

Finally, that good old catchall — career broadening — comes into play. ATC IP duty provides a whole new range of opportunities to develop abilities and talents that will serve to further your career.

In the final analysis, pros and cons accompany every assignment you'll face during your Air Force career. The key is to accept new challenges, take the initiative and step out front no matter what your current job is. Whether you stay in SAC or opt for ATC, you will have to work hard to progress in your Air Force career. ATC just offers a different route to that goal.

The opportunity is there.
The choice is yours.

From the Bomber/Tanker Career Management Shop concerning aircrew duty. This area is the core of rated progression and is your key to career advancement. Your performance record and reputation as a rated officer get started in the crew force and are strengthened in the flow of assignments back into crew duty throughout your careers. Today, the strategic bomber/tanker resource is experiencing an average in most rated specialties due to an influx of inexperienced crewmembers. However, this will allow more crewmembers the opportunity for career-broadening assignments as experience matures. Career-broadening assignments are any assignments where your primary duty is other than a crewmember in the major weapon system (Rated Supplement, ATC duty, a staff assignment, etc.). After career-broadening you can expect to return to the crew force to provide expertise, fill the key leadership positions, and update your own opportunities available to you by discussing assignments with your commander, reviewing AFP 36-6, Assignment Information Director (AID), etc. The key to achieving the right job is twofold. First, you must maintain a competitive record of performance. Second, you need to actively participate in the assignment process, through your commander, with the HQ SAC and HQ AFMPC resource managers. We at HQ AFMPC stand ready to discuss career opportunities and work for that assignment that fits your needs in line with the needs of the Air Force. Keep in touch with your resource manager and keep your Form 90 up to date. (Lt Col David F. Johnson, chief, Bomber/Tanker Career Management Section, HQ AFMPC/MPCROR3, Autovon 487-2412).

Well Done!

On 22 December 1982, Maj Bernard J. Smith, AC, and Maj Eddie E. McKim, RSO, successfully recovered a crippled SR-71 under extremely adverse circumstances.

While flying an operational night mission above 70,000 feet and at Mach 3, Maj Smith observed a left generator failure. The appropriate emergency procedures were accomplished but the generator failed to reset. Loss of a generator requires landing as soon as possible since a subsequent failure of the remaining generator would require abandoning the aircraft.

Maj Smith aborted the mission and selected Grand Forks as the nearest suitable emergency recovery airfield. Maj McKim declared an emergency and advised ATC of the need to deviate immediately from the planned flight routing while Maj Smith began decelerating from Mach 3 to subsonic speed. SR-71 decelerations from high Mach and high altitude can readily induce spatial disorientation. The problem is greatly magnified at night, and was further compounded on this flight by the emergency situation and the urgent descending turn toward the recovery base. Precise crew coordination was essential to maintain safe control of the situation during this period. Maj Smith concentrated on aircraft control while Maj McKim completed all applicable emergency checklist items and provided timely navigation vectors to Grand Forks.

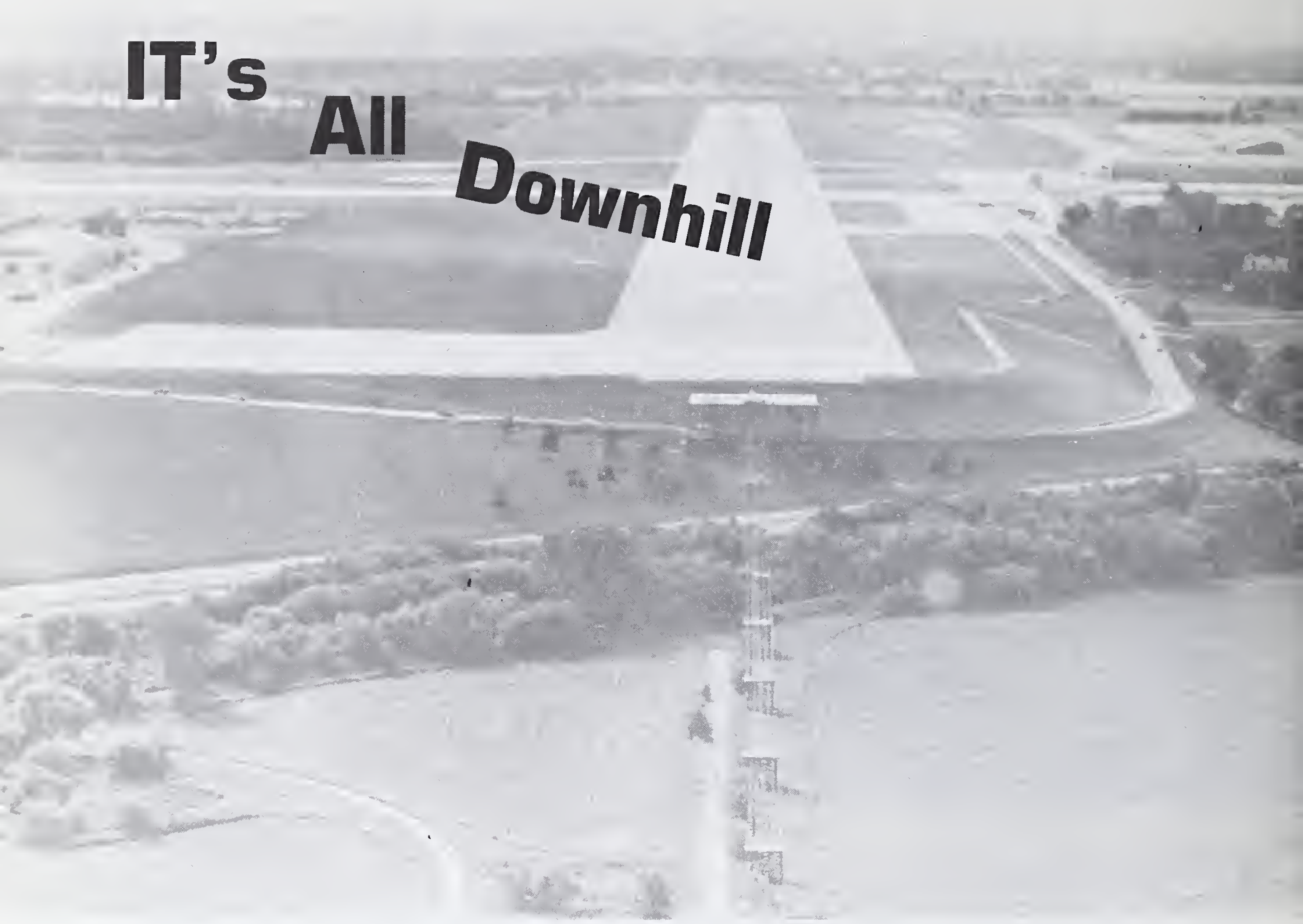
Weather conditions at Grand Forks were reported as an 800 foot broken cloud layer, 1200 foot overcast, two and one-half miles visibility, winds calm, and a runway condition reading (RCR) of 14. During the descent a primary hydraulic system failed, indicating an accessory drive system (ADS) failure. ADS failure is extremely serious and if not handled correctly can lead to engine failure or shutdown. The ADS emergency checklist was being performed when a secondary hydraulic system failed, causing additional emergency procedures and crew tasking. Landing soon was imperative. The fuel load was adjusted to attain normal landing weight as the SR-71 neared Grand Forks. A weather update minutes before landing showed rapidly deteriorating conditions; 200 feet overcast, one-half mile visibility, and an RCR of 06 with freezing drizzle. Weather was now at absolute minimums for the SR-71 and the runway was icing over. However, the crew was committed, having already lightened the fuel load for landing.

Maj Smith lowered the landing gear by the alternate method due to the hydraulic system failure. He then flew the ILS approach to the published minimum altitude of 200 feet above ground level. The runway could not be seen. Just as a missed approach was initiated the RSO reported the runway lights in view through his viewsight. He alerted the pilot who adjusted the aircraft enough to see the runway below. Maj Smith accomplished an on-speed landing, deployed the drag chute and checked the nose wheel steering and wheel brakes. Braking action appeared normal, so the drag chute was jettisoned at 60 knots with 7000 feet of runway remaining.

The aircrew experienced a significant loss of aircraft deceleration when passing the 5000 feet remaining marker. Wheel braking was totally ineffective on the remaining section of the runway that was now iced over. Without braking capability, idle thrust was actually accelerating the aircraft. With 4000 feet of the runway remaining they realized that drastic action would be required to stop the aircraft on the runway surface. The left engine was shut down with the hope that the reduction of thrust would be sufficient to slow the aircraft. Seconds later the SR-71 yawed sideways to the left, sliding dangerously close to the edge of the icy runway. Maj Smith quickly shut down the right engine to alleviate the asymetrical thrust condition and to regain directional control.

The aircraft was stopped on the runway approximately 2000 feet from the end, angled 45 degrees left of runway heading with nosegear 15 feet from the left edge of the runway surface. The aircrew safely egressed and the aircraft was towed in undamaged.

IT's All Downhill



(Photo courtesy of 1ACCS)

Major Steve Turner
55 SRW

Most of you have probably heard a horror story or two about landing on runway 12 at Offutt AFB. Just reading the IFR supplement will give you a clue as to what's in store for you. We probably see more transient traffic here than any other SAC base, and if you happen to arrive on the right day, a landing on Runway 12 can be a real handful. This article hopefully will put you in the "forewarned is forearmed" category and you won't have to add to the list of horror stories.

Crosswinds

While the crosswind velocity is no worse than at many other bases, the physical environment and numerous obstructions can make even a 15 knot crosswind landing tricky. Invariably, you will have a right cross, and except for a high likelihood of wind shear on short final, normal inputs will be required until approaching the landing flare. In the flare however, the line of trees and several buildings immediately adjacent to the right side of the runway (see figure 2) tend to break up the crosswind and make it unpredictable. It often appears to die out completely, but this is not always the case. Fly the airplane, guys. The obstructions end about halfway down the runway and at this point you'll get that crosswind back at full force. Anticipate the requirements for additional aileron into the wind and you shouldn't have any problem. Remember, if you're doing a touch and go, this is just about the point at which you will be stabilizing a touch and go power and the effects will be even more pronounced.

Runway Slope and Visual Illusions

Refer to figure 1 and you will see that there is a significant downslope (average of .6%) and that some of the worst part of it is in the area where you're trying to get the machine stopped. Obviously, a reduced RCR is going to complicate matters. To make matters worse, there is a displaced threshold on both ends (1001 feet on runway 12), so the usable runway is reduced to 10,700 feet. Additionally, the combination of a 3.0 degree PAR glide path (no ILS available), the downsloping runway, and the fact that the terrain immediately preceding the runway threshold is approximately 60 feet lower may give you some visual cues that make you feel uncomfortable. This is not the time to get creative with your glide path. Use all available information, remember the displaced threshold, and plan for a normal landing. If your normal landing is 3000 feet or more down the runway, now is the time to start rethinking your technique, not when on short final to this particular runway.

Odds and Ends

Several other unique situations exist at Offutt that you need to be aware of. Approach to runway 12 is over Omaha and your final will take you over two civilian airports at 2000 feet AGL or less. Watch out for airborne **cornhuskers.** Additionally, the base is adjacent to the Missouri River which is one of the prime victor airways for our fellow aviators of the feathered variety. Heads up is the name of the game. Fill that jumpseat with an extra set of eyeballs.

Offutt is home of the 1 ACCS, sole Air Force operators of the E-4. While approach control and tower will do an excellent job letting you know the location of the very-heavies, know in your own mind what you want for wake turbulence spacing and don't hesitate to ask for more if you need it.

Finally, be aware that the taxiways for access to and exit from the runway are not located at the end (see figure 2, points A and B). This may require a 180° turn on the runway if your ground roll is a little long. Expect transient alert to park you somewhere near point C.

Plan ahead, enjoy your trip and a hearty welcome to Offutt.

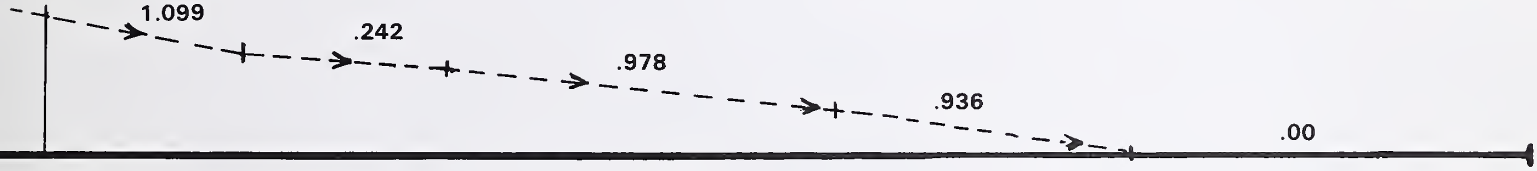
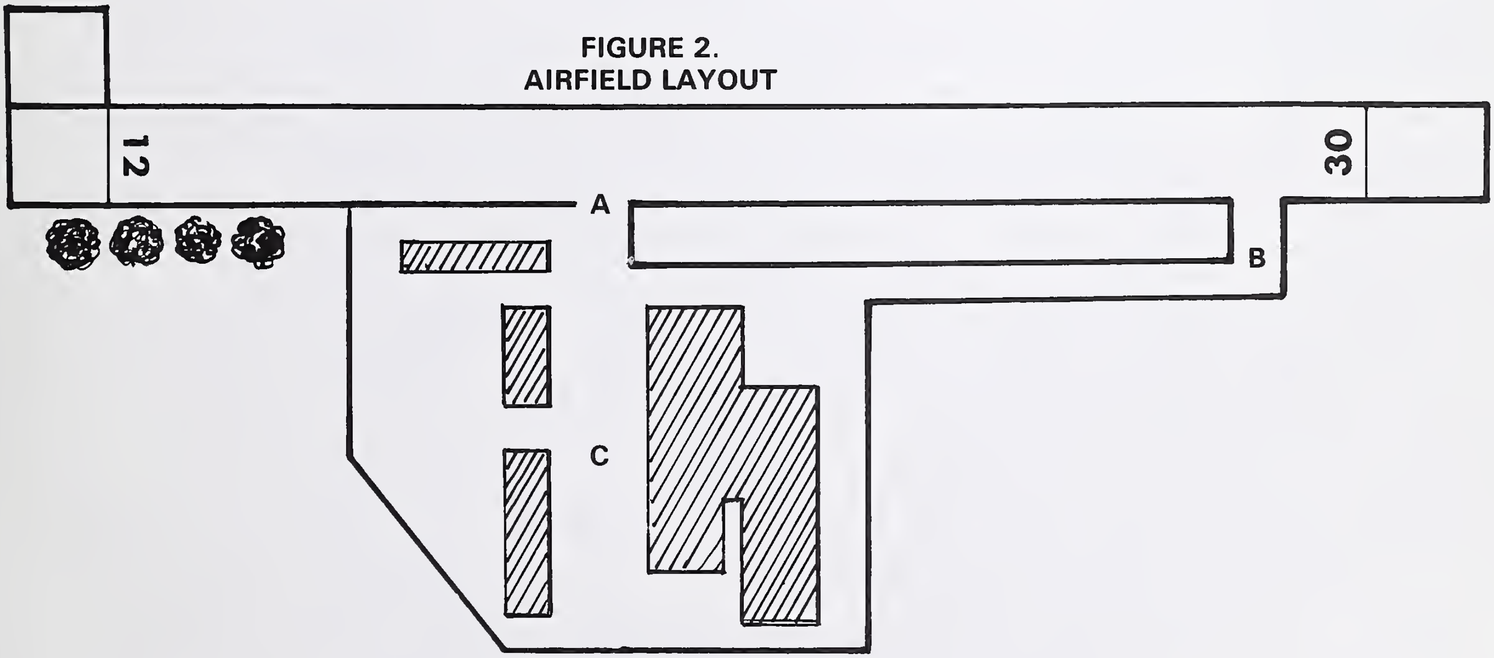


FIGURE 1.
RWY GRADE

FIGURE 2.
AIRFIELD LAYOUT



SAC SAR

Capt Edward J. McDermott
Maj Hall R. Meyer
909 AREFS, Kadena AB

"**MAYDAY MAYDAY MAYDAY,** Freighter AINA HAINA, 17-00N 118-21E, Sinking, Abandoning ship . . ."

"GUILD 49 GUILD 49, this is Clark Rescue, terminate refueling; proceed direct to 17-00N 118-21E; ship in distress; begin search operation; you are the on scene commander."

Twice within 30 days SAC KC-135 aircrews flying out of Kadena AB, Japan, were diverted to conduct actual search and rescue (SAR) operations. Are you prepared to be an on scene commander or to conduct a systematic search pattern? Could you be effective with only ten minutes notice?

Contrary to popular belief, search and rescue is not a job just for the Aerospace Rescue and Recovery Service (ARRS), the Coast Guard or the Civil Air Patrol; any aircraft, any ship, or any person could be called upon to aid someone in distress. Because of the places we fly and the range and endurance capabilities of the KC-135, you too may find yourself being diverted to support SAR efforts. SAC aircrew involvement would probably be one of three types: radio relay, on scene commander or aerial search.

Figure 1

SWEEP WIDTH FOR VISUAL SEARCH IN NAUTICAL MILES

	LIFE RAFTS	SMALL CRAFT (LESS THAN 30 FT.)		SMALL CRAFT (30 to 60 FT.)	
ALTITUDE	2,000 FT.	2,000	3,000	2,000	3,000
visibility 3	1.0	1.8	0.4	1.8	0.4
5	2.7	3.2	3.3	4.2	4.3
10	3.6	4.5	5.8	6.2	6.5

NOTE. Visibilities less than 3nm would require descent below 2,000 ft.

Acting as a radio relay aircraft between the SAR aircraft and a rescue coordination center (RCC), (ground command post specifically trained to conduct SAR operations) is the most likely involvement. This is often required when all SAR aircraft are flying below 3000′ AGL and the terrain between the search area and the RCC prohibits direct communication or HF propagation is inadequate. The relay aircraft's job is to keep the communication lines open between the RCC and the on scene commander, passing information as requested by either side.

To reduce confusion and enhance efficiency, it is paramount to divide up the duties within the cockpit. Designate one pilot to FLY THE AIRCRAFT. Engage the autopilot and set up an orbital pattern steering to aid in area navigation and reduce crew workload. Fly at an altitude which permits good communications with both sides — 10,000-20,000 feet should be adequate — and provide reasonable fuel consumption. Try to remain VFR if possible. Fly endurance airspeed; you may be there a long time. Designate another crewmember to communicate with the RCC. Another crewmember, probably the navigator, should communicate with the on scene commander. He should also keep a running log of what occurs including times. The log could be a second on scene commander's log as will be discussed later. The log will be very important for reconstructing the mission or should you become the on scene commander, you'll already have the data. However, don't be overzealous and request a lot of extra data from the on scene commander; get it by being a silent partner. The remaining crewmember could monitor the third radio or help out as the situation dictates. Listed below are the most probable frequencies that you'll use while on scene:

Primary	Emergency
UHF 282.8	243.0
VHF 123.1	121.5
HF 5680	2182
HF 9027 RCC Common	

The on scene commander is responsible for efficiently executing the SAR mission on scene. Unless no SAR aircraft are in the area, you will probably not become the on scene commander because of the lack of training in specific duties and responsibilities. The on scene commander carries out the search plan in conjunction with the rescue coordination center. Consider the RCC the experts and follow their directions. However, as on scene commander you must exercise your best judgment in accomplishing the mission. If deviations or revisions are necessary, let the RCC know.

The primary duties of the on scene commander are to function as controller and accountant of all SAR efforts in the area. Specifically:

- Log each SAR aircraft into the area.
- Assign a specific search area using latitude and longitude (a C-130 can normally cover a 10 mile square

in one hour; a helicopter in two hours).

- Assign a specific altitude for proceeding to/from the search area.
- Obtain the loiter time available for each aircraft and ensure they leave on time.
- Obtain operations normal checks from each aircraft (every 15 minutes for single engine; every 30 minutes for multiengine aircraft).
- Check each aircraft out of the area.
- Keep other non SAR aircraft out of the area. Sightseers are always trouble.

Specific division of duties within the aircraft, as previously discussed, is a must. The autopilot and inertial navigation system can again be used to lighten the load on the crew. Fuel and endurance time permitting, fly at 5000 - 10,000 feet AGL. Try to remain VFR. Try to maintain visual contact with the other SAR aircraft. If you don't have a radio relay aircraft, fly an altitude that permits communication with the RCC. Fly endurance airspeed.

The probability of performing aerial search activities is also very low. However, the oceans are vast and you could be the first person on the scene. The three basic methods of aerial search are visual, radar and electronic. All three may be used in conjunction; however, when visibility permits, a visual search should be the primary method. When this method is used care should be taken to minimize the amount of glare reflected off the ocean. A routine scanning pattern should be used pausing each 3° or 4° of lateral or vertical distance at a rate which will cover about 10° per second. This procedure is effective since most sightings are likely to occur in an area limited by a 5° radius in all directions from the fixation point at which your eyes are focused. You should not jump too far between fixations and pause only briefly between fixations during a daylight search. If you are searching at night with the expectation of finding light signals or flares, you need not pause so frequently in sweeping the visual field.

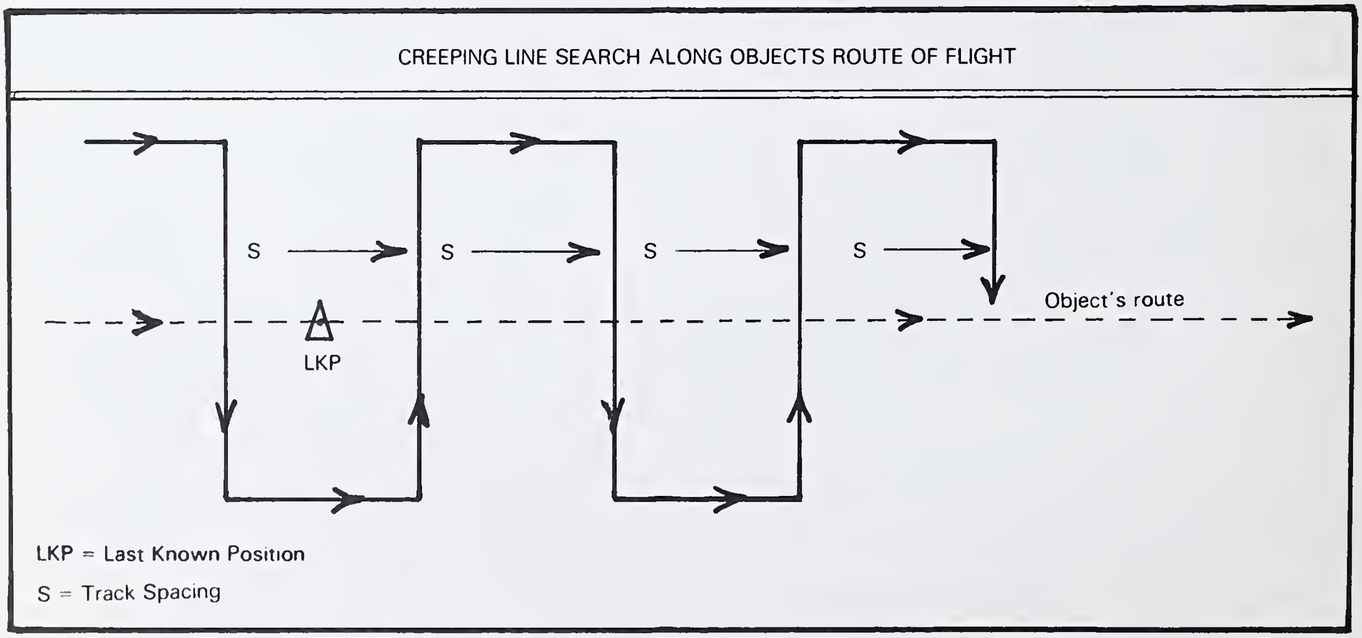
A radar search can also be effective when there is decreased visibility and the search objective provides a recognizable return. Ships at sea make excellent radar targets due to the lack of background clutter. They appear similar to a single APN 69 beacon code. Caution must be advised when using this method. Larger radar targets are often detected far outside visual range. If each target is investigated when contact is first made considerable time may be lost. If a target is detected at a distance from the track of the aircraft, it should be plotted by the navigator. If the plotted position shows it is considerably closer to the next search leg (to be discussed later), it should be identified on the next search leg. Small objects should be investigated when contact is first made as the distance is usually short and they may be difficult to detect again.

An electronic search will be used when searching for survivors and craft with transceivers and radio beacons. The ADF function of Comm 1 should be employed to help locate the search objective. All applicable distress frequencies should be monitored at all times during the search, except when making required transmissions.

The pilot in close coordination with the navigator should evaluate the situation for search coverage required. An appropriate method of search, type of search pattern, altitude, airspeed and track spacing must be decided upon before commencing any search. There are many factors you must consider. Several are:

- Weather conditions.
- Terrain characteristics, if over land.
- Sea condition, if over water.

Figure 2


CREEPING LINE SEARCH ALONG OBJECTS ROUTE OF FLIGHT
S
S
S
S
Object's route
LKP
LKP = Last Known Position
S = Track Spacing

- Time of search; i.e. daylight or darkness.
- Signalling aids of survivors.
- Objective's size, shape and color contrast with surroundings.
- Accuracy of estimated location of objective.
- Your fuel endurance.

The key element in any search is developing systematic and methodical search plans which will ensure a high probability of a sighting.

Track spacing must be carefully established and never greater than twice the visual detection range. By decreasing track spacing, the probability of detection is increased at the expense of the time required to search a given area. Generally, track spacing should be greater during preliminary search than during a concentrated search. Sweep width for average conditions should be used as a basis to establish track spacing (Fig 1). Individuals in a life jacket are almost impossible to detect unless they have signaling devices; therefore a detection range of one-half nautical mile should be used under these circumstances. A rule of thumb for determining track spacing is: Expected visual detection range times two equals track spacing.

Rescue crews in ARRS are trained in several search patterns. These include: route search, parallel search, creeping line search, expanding square search and sector search. These patterns range from the very complex to the relatively simple. Since our expertise is limited in this area, I'll discuss two patterns which are easy to accomplish and are also effective. They are easily established and maintained using the INS/DNS cross track/track angle error function.

Creeping Line Search

The creeping line search (Fig 2) is a series of parallel tracks advancing along an objective's last known track. The longer legs are perpendicular to the track and are sufficient in length to allow for navigational error or drift. The cross legs should be equal to the desired track spacing. You should begin this pattern at one extremity of the intended track or at an assigned point along the track. Once again, your turns should be made using standard rate unless track spacing is less than the diameter of your turn.

Parallel Search

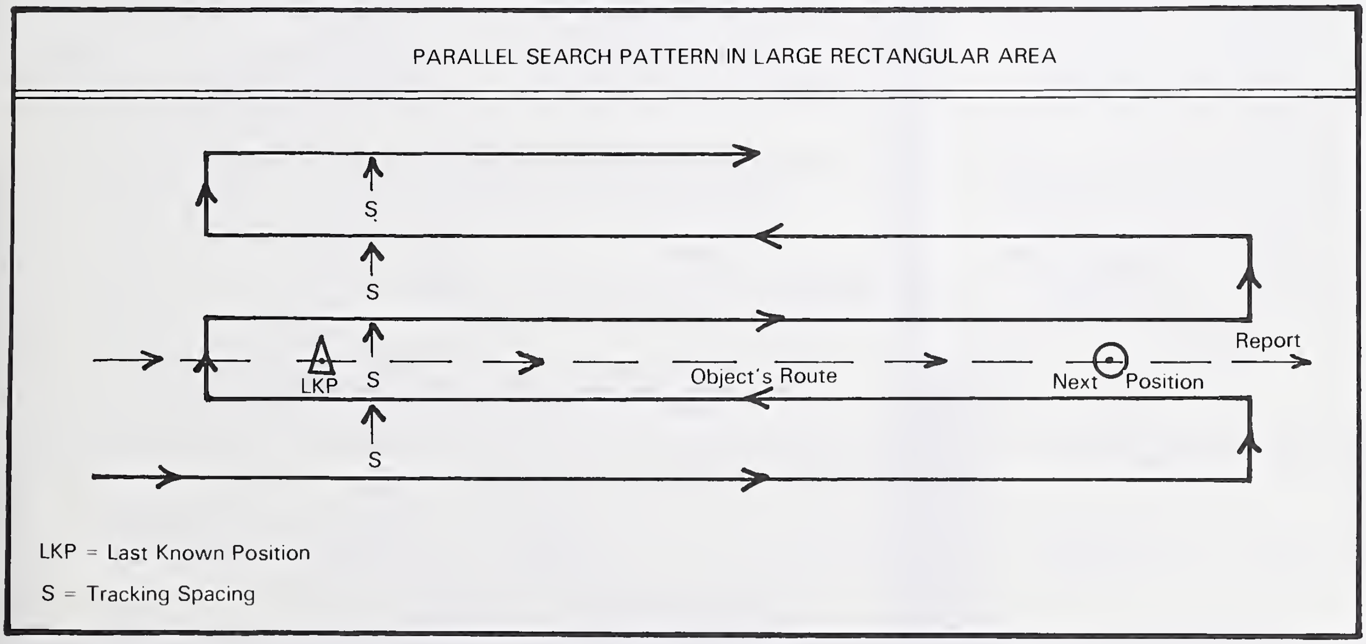
Parallel search is executed in the same manner as the creeping line search. The difference is that the search tracks run parallel, not perpendicular, to the objective's intended track (Fig 3). The short legs of the parallel should be equal to the track spacing. This type of search pattern should be used when the objective is expected to be between two points and possibly off track due to navigational error.

Hopefully, you will never have to use the data I've given you; but should the need arise I'm sure you'll be better prepared than I was my first time. Things to remember:

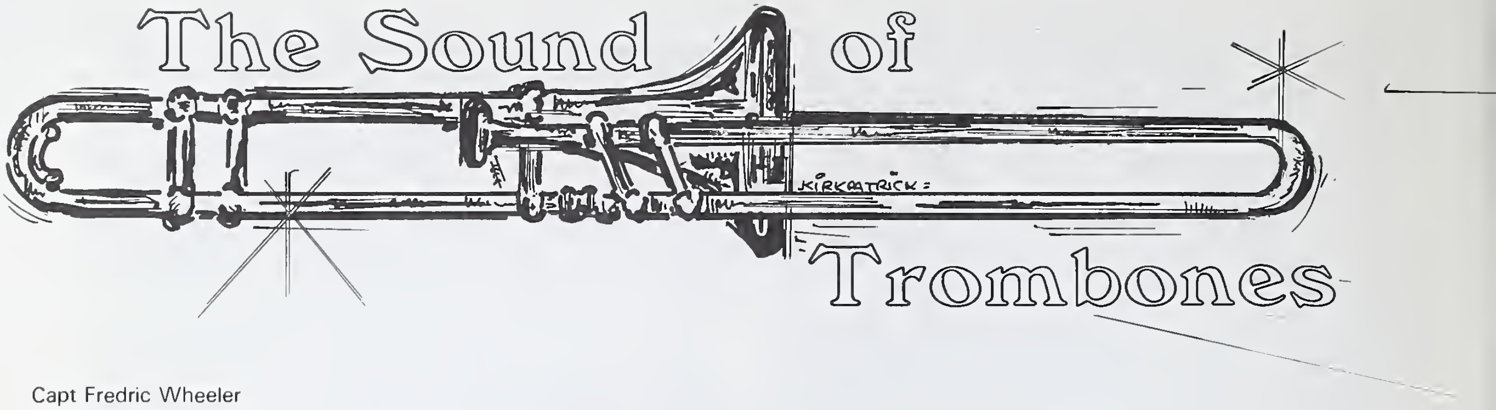
- The first 12-24 hours after distress are the most critical for recovery of survivors.
- Adequate communications are a mandatory prerequisite for successful SAR operations.
- The rescue coordination center personnel are trained professionals — use them.
- Divide up the workload. No one's a hero unless the mission is successful.
- Don't run out of fuel and become more involved than you wish.

P.S. You may want to file this article away in your flight bag just in case.

Figure 3


PARALLEL SEARCH PATTERN IN LARGE RECTANGULAR AREA
S
S
S
S
LKP
Object's Route
Report
Next Position
LKP = Last Known Position
S = Tracking Spacing

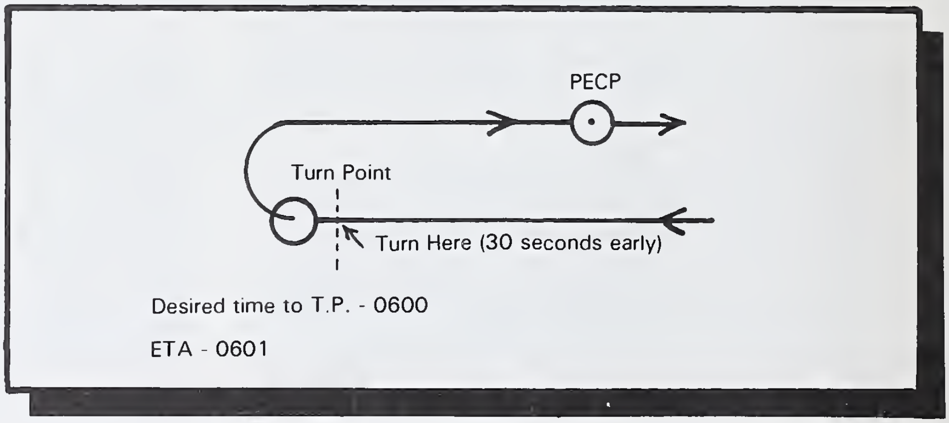
The Sound of Trombones



Capt Fredric Wheeler
596 BMS, Barksdale AFB

The sound of trombones (timing trombones or loops, that is) should not be the sound of those big B-52 jet engines turning at Warp 9 over the length of the entire trombone. Rather, the sound should be the quiet whisper of those same engines droning to a precomputed turn point on the trombone that will allow the crew to reach the PECP within the 2½ minute time tolerance without any extreme increases or decreases in airspeed. This article will discuss several techniques in using timing trombones in the most effective way.

Figure 2



To use a timing trombone (TT) effectively it must first be planned effectively. The first leg of the timing loop should pass the PECP on approximately the reciprocal heading of the heading on first leg of TT 270. (See figure 1). So that no large turns at the PECP will have to be made, the heading into the PECP should be the same as the first heading in the low level route.

Another consideration is altitude. Obviously, since one flies opposite directions on the TT it will be impossible to plan the entire TT at the same altitude. In my experience, most navigators prefer to be at the PECP altitude somewhere on the second leg of the TT so as not to make a screaming descent into the low level route. To make most effective use of the TT, the first leg should be planned as close to the PECP altitude as possible (example — PECP altitude 23.0, first leg of TT 24.0).

The last consideration when planning a TT is airspeed. Since one must plan to fly 280 KIAS at the PECP, it makes sense to plan the TT at 280 KIAS. If one has a long TT however, one might consider planning the TT at a more fuel efficient airspeed (consult the copilot). Remember, though, if one flys a different IAS than 280, be sure to be

Figure 1

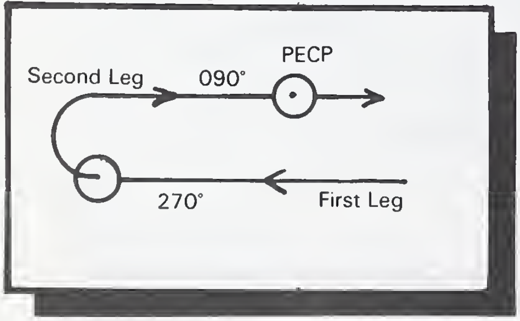
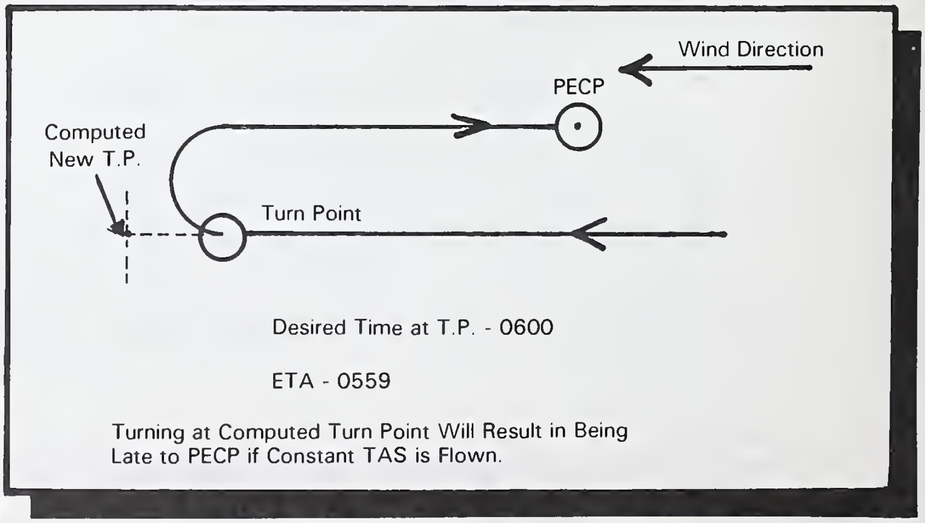


Figure 3


Wind Direction
PECP
Computed New T.P.
Turn Point
Desired Time at T.P. - 0600
ETA - 0559
Turning at Computed Turn Point Will Result in Being Late to PECP if Constant TAS is Flown.

at 280 KIAS when reaching the PECP.

Now the important part: using the TT effectively. The easiest (but not the most accurate) way of using the TT is by computing an ETA to the turn point on the TT and adjusting the ground track accordingly (example — one minute late to turn point, turn 30 seconds early to be on time to the PECP. (See Figure 2). This fails, however, to account for that old nemesis of every navigator, the wind. If one is one minute early to the TT turn point with a large tail wind and turns 30 seconds late, one will be late to the PECP (using the same TAS) since that tail wind has now become a head wind into the PECP (see figure 3).

The most effective method can, with a little practice, also become very easy to use. The benefits of using this method are: 1) being on time at the PECP and 2) flying the same true airspeed on both legs of the TT without any great changes in TAS.

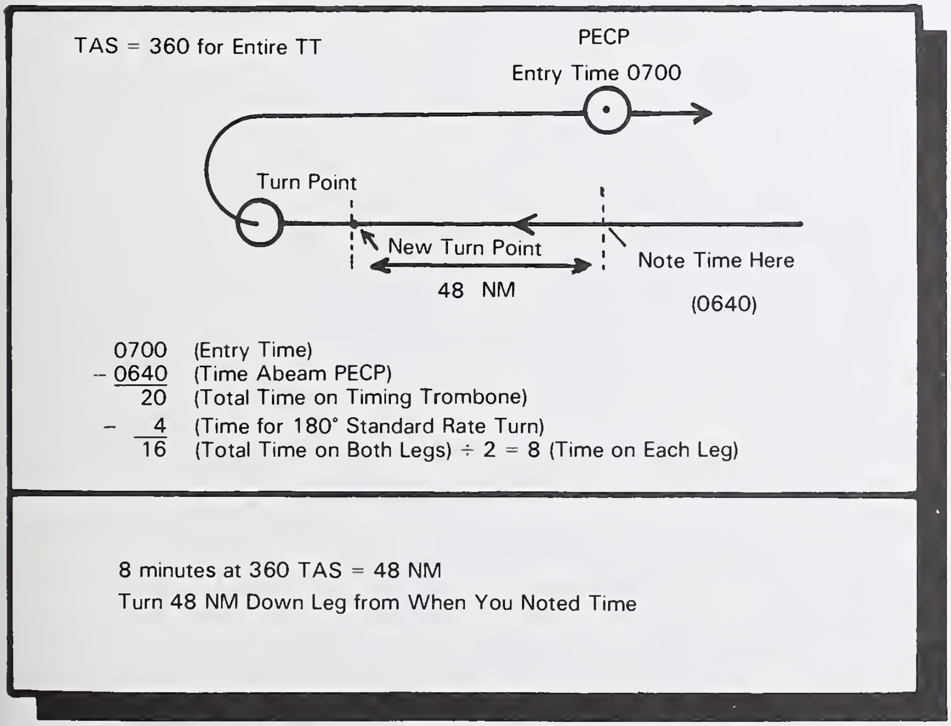
First of all, note the time you pass the PECP on the TT. Subtract this time from the desired PECP entry time. This will give you the total time you want to spend on the TT. Next subtract four minutes for that standard rate 180 degree turn you are going to make at the end of the TT. This will give you the total time you want to spend on both straight legs of the TT. Finally, divide this time by two and you have the time to spend on each leg of the TT. Since the wind will affect you by the same amount on both legs of the TT, have the pilot fly a constant TAS for the duration of the TT. Span off the time you need to fly on each leg against this TAS, **not** groundspeed, and you have your new turn point on the TT (see figure 4).

All this is fine, but what if restricted air space precludes you from planning the TT on the first heading in the low level route? With slight modification the above method can still be used effectively. Instead of controlling time to the PECP, control your time to the point where you start your turn into the PECP (if you are making a 90 degree turn into the PECP this point will normally be two minutes earlier than the PECP time). Follow the other procedures as you would any normal TT problem and you'll be on time to the PECP (see figure 5).

What if ARTCC won't let you descend to your planned altitude prior to passing the PECP? Once again, no big problem. Have the pilot slow (or speed up) to the TAS you want for low level entry and fly this TAS for the TT. When ARTCC does give you clearance to descend, descend on this TAS instead of 280 KIAS and your computations will still work.

Well, that's it concerning timing trombones. Hopefully, by using the previously mentioned techniques, all of you navigators out there can listen to the quiet purr of those jet engines while still being on time to your control points.

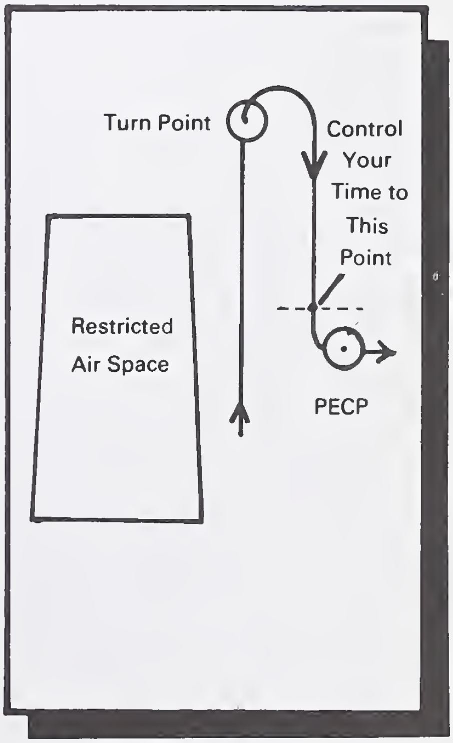
Figure 4



0700 (Entry Time)
– 0640 (Time Abeam PECP)
20 (Total Time on Timing Trombone)
– 4 (Time for 180° Standard Rate Turn)
16 (Total Time on Both Legs) ÷ 2 = 8 (Time on Each Leg)

8 minutes at 360 TAS = 48 NM
Turn 48 NM Down Leg from When You Noted Time

Figure 5



CROSSCHECK
IFC

Lost Comm . . .

In our first article, we said we're here to answer instrument questions — little did we realize so many questions were going unanswered out there!

Our original plan was to answer a potpourri of questions in these Q & A articles. But so many two-way radio failure questions came in, we'll devote this article to the dreaded "LOST COMM." Space did not permit us to answer all the lost comm questions in one article; so you'll probably see more on this in the future. We have added a couple of ITC's (items to consider) at the end of this article which could help reduce the stress caused by radio failure.

Q. Para 6-1a of AFM 51-37 states, "If the requested enroute descent is to a radar final, coordinate your lost communication instructions with ATC." But in para 6-17b it says, "If you experience lost communications, you are automatically cleared to fly any published approach . . ." Aren't these statements contradictory?

A. No. We are dealing with two entirely different situations. Para 6-1a refers to your initial request for a descent (enroute vs published instrument procedure). In this situation, if you fail to coordinate lost comm, you would be expected to fly to the IAF, hold until your ETE, and penetrate. So for radar finals, definitely coordinate lost comm before commencing enroute descent (check out ITC number one for some additional thoughts on this subject). Para 6-17b applies to another situation: lost comm in the radar pattern while flying radar approaches. We no longer have any filed routing or expected clearance so, "you are automatically cleared to fly any published approach . . ." Just so the whole story is told, the rest of the sentence reads, ". . . unless the controller previously issued a specific lost communications approach."

Q. (Tanker specific) If I filed a 20 minute delay at a published ARCP and lose radios enroute to it, am I expected to hold at the ARCP or continue on my routing and then hold for the 20 minutes at my filed IAF?

A. Hold at the ARCP. ARTCC protects this airspace like a holding pattern and expects you to use it accordingly, before continuing on your filed routing.

Q. (Bomber specific) Should I fly from my filed IR entry point direct to the exit fix if I lose radios prior to route clearance?

A. No. When you filed the IR route, you filed for every radial/DME fix that defines the entire IR routing. So if you lose radios, overfly the entire route, including reentries. (What about maintaining centerline at high altitude? ARTCC expects you to maintain centerline so they can keep other aircraft clear of you. Also try to make your exit on time. In a radar out situation, ATC will keep other aircraft clear of the exit area at your filed exit time.)

Q. If I'm at FL 350 and experience lost comm while in VMC, am I expected to descend out of the PCA VFR?

A. Yes, but check the Flight Information Handbook under radio out "IFR FLIGHT PLAN . . . VMC" for the intent, especially the part about "pilot retains his prerogative."

Q. For radio failure, the FIH says ATC will attempt contact by transmitting on available frequencies of navaids. What frequencies of what navaids?

A. Your best bet is to monitor VHF guard (121.5) and/or select the nearest navaid which has voice capability. (Remember, on the ENROUTE LOW/HIGH ALTITUDE CHARTS, an underlined navaid frequency indicates NO VOICE capability. Even though TACAN channels are not underlined, they do not have voice capability. When monitoring, make sure it's the VOR, not the TACAN!)

ITC's (Items to Consider)

Don't ask center for an enroute descent to a radar final if another suitable published final approach is available. This way, if you lose radios descending out of the PCA, you'll have a fix to fly to (if you complied with AFM 51-37's para 6-1a, ". . . request an enroute descent to specific FAF that serves the destination airport.") Your request to a specific fix constitutes clearance in the absence of any other assigned routing. As for the radar final you actually wanted to fly, request it (and coordinate lost comm) from approach control — the people who really care about your terminal procedures. Think about it.

"During two-way radio communications failure, when confronted with a situation not covered in the regulation, pilots are expected to exercise good judgment in what-

Is Anyone Listening?

ever action they elect to take." A big assumption is made in this first sentence from the Flight Information Handbook's two-way radio failure section. It assumes we'll realize we're in a "situation not covered in the regulation." In other words, we know the rules so well, we know none of them apply to our situation. Is this true? There are four considerations under ROUTE and three under ALTITUDE. Do you remember them? Can you apply them? How about operating in VMC under an IFR Flight Plan would you descend? All these questions can be answered in the two-radio failure section of the FIH, and must be answered before you resort to using up your "good judgment" unnecessarily.

SIFC encourages questions and suggestions regarding instrument flying. Your comments are used in the "SIFC CROSSCHECK" article and to clarify regulations affecting instrument flying. Call or write SIFC/DOI, Castle AFB, CA 95342; AV 347-2229/4571.

From the SAC Instrument Flight Course

(Photo by Maj C. D. Short, USAF, Loring AFB)

Aircraft Maintenance

A1C Frank G. Barker, 97 BMW, Blytheville AFB, is SAC Maintenance Airman of the Month. As a structural repairman, excelling in unusual repairs and manufacturing projects, Airman Barker has significantly enhanced his squadron's in-house repair capabilities through consistently flawless and professional workmanship. A1C Barker's unique talents were recently illustrated in the repair of a damaged B-52G wing leading edge hit by a bird. Replacements for each damaged wing component were meticulously crafted without benefit of samples or drawings with such precision that each item fit perfectly at first installation. Result: the aircraft was returned to flying status in less than half the estimated repair time. A1C Barker's knowledge of shop operations and fabrication procedures have been instrumental to the high monthly MSEP ratings earned by the structural repair shop. In addition, his personal MSEP task evaluation pass rating has been 100 percent since March 1982.

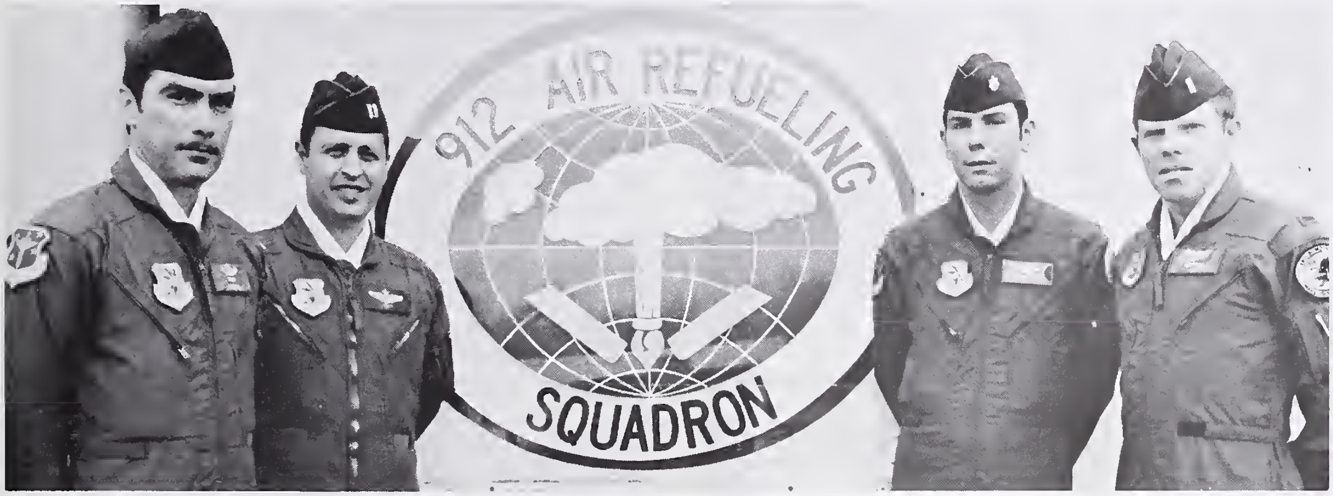
Missile Maintenance

Sgt Kevin A. Winston, 44 SMW, Ellsworth AFB, is SAC ICBM Maintenance Airman of the Month. In 1982 alone, Sgt Winston was responsible for training over 20 combat targeting technicians, all of which passed their initial QC evaluations. Recently honored with the Master Instructor Award, Sgt Winston's exceptional training abilities are matched by his technical knowledge and competence. He has voluntarily spent many of his off duty hours on the design and construction of a complex combat targeting trainer and is currently developing lesson plans and technical data on the operation of the training facility. During a recent visit by the 3901 SMES, Sgt Winston was instrumental in the team training branch receiving an outstanding rating in the instructor proficiency area by being awarded a highly qualified rating on his evaluation. His performance was so impressive he was designated as an Outstanding Performer by the 3901 evaluators.

PROFESSIONAL PERFORMERS

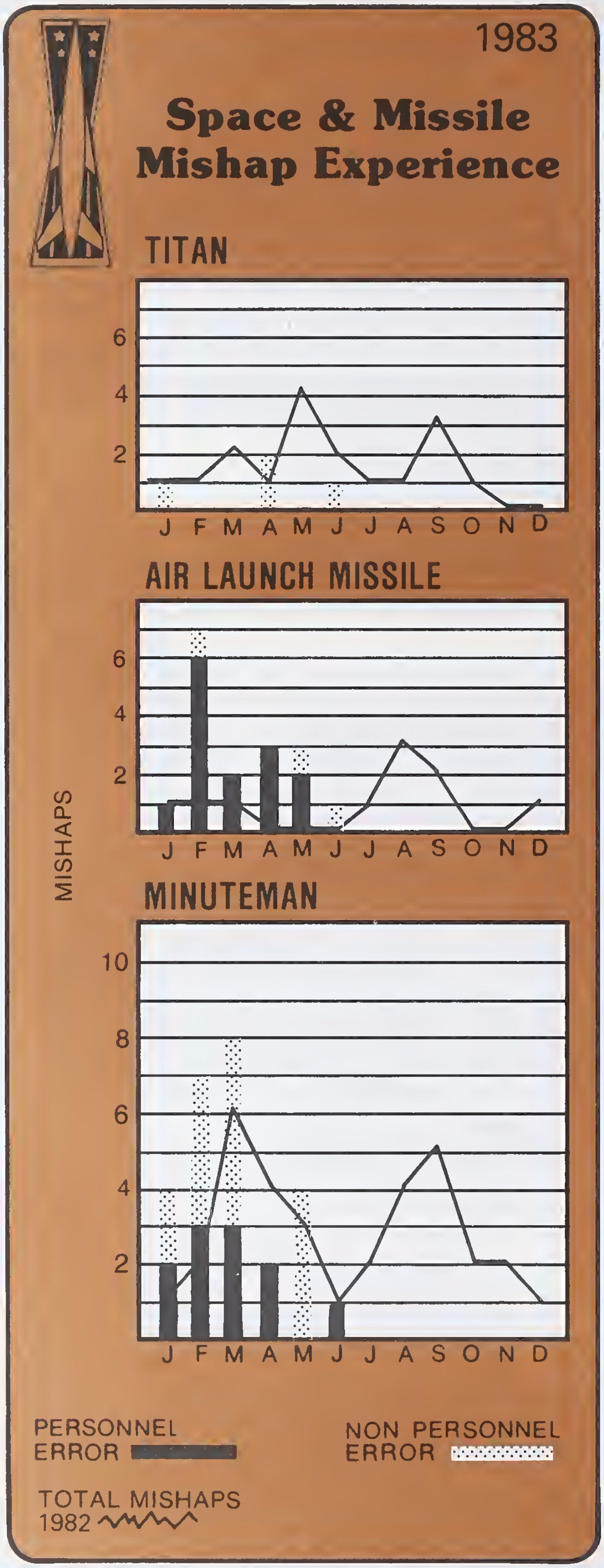
Missile Crew

1Lt Allyn W. Delwiche and 1Lt Edward B. Schmidt, 351 SMW, Whiteman AFB, are SAC's Missile Crew of the Month. Recently this crew assumed command Oscar LCC, the command post in a unique emergency rocket communications system configured squadron, the site was already operating on the emergency air conditioning system. The normal environmental control system was malfunctioning and maintenance were on site attempting to troubleshoot the system. The crew was notified by the maintenance team that the brine chiller had developed a critical freon leak at the sight glass. The crew directed shutdown of the brine chiller, completed LCC manual hardening, evacuated the maintenance team and notified wing job control and the command post. The missile potential hazard team was activated, bioenvironmental engineering was contacted and the maintenance were examined by the flight surgeon for possible contamination. After isolating selected communications racks to reduce the load on the emergency air-conditioning equipment, the crew monitored the emergency dispatch of the bioenvironmental team until the atmosphere was safe for maintenance to reenter the area. The maintenance team was finally able to isolate and repair the freon leak, the ECS was restarted and shutdown of the LCC was avoided. The professionalism of Lieutenants Delwiche and Schmidt to this life threatening situation insured the safe operational capability of the LCC and the squadron.



Flying Crew

Capt Morris D. Clary, P; 1Lt Robin P. Needham, CP; Maj George B. Wingard, N; and MSgt William H. Jackson, BO, 19th BMW, Robins AFB, are SAC's Flying Crew of the Month. While awaiting pre-takeoff inspection by the SOF, the crew detected problems in the pilot's altimeter and aircraft radar. Takeoff was delayed while the altimeter was replaced by maintenance. The navigator and boom operator disembarked the aircraft while maintenance was being performed. The pilots noticed the navigator indicating that something was leaking from the left side of the aircraft. The boom operator alertly investigated, hooked into the aircraft interphone system and reported that the number two engine was leaking fuel. The pilot immediately shut down the engine and the copilot coordinated for assistance. Maintenance reported the leak to be "within limits" and indicated no further action was needed. Flying experience, system knowledge and safety awareness was exemplified by the crew when they refused to accept the aircraft for flight and pressed for maintenance to investigate. Within five minutes, the pilot had to shut down the number one engine when an identical leak developed. Investigation determined that engine fuel strainers and seals had been removed, not replaced and not recorded in maintenance records. The vibration of the engines during taxi loosened the unsecure fuel seals and would have led to loss and probable airborne fire on both engines after takeoff.


1983

Space & Missile Mishap Experience

DESCENTS . . .

The Easy Way

Cont'd from page 7

constantly changing during the descent, the VVI will change if the same indicated airspeed is flown. This is why all the math is necessary. If the pilot simply holds a 2000 feet per minute descent, he/she has absolutely no idea if the descent rate is adequate and is just hoping the airplane will reach 1800 feet by six nautical miles.

A pilot shouldn't "hope" anything. Leave that up to the passengers. The pilot must "know" how things are going at all times. Computing and using descent gradients is a relatively easy way to monitor all descents, and it avoids surprises (or embarrassment) at level-off time.

You have previously computed that an altitude loss of 500 feet per NM is required. Since one degree of pitch change on the attitude indicator equals 100 feet per nautical mile, a five degree pitch change must be made. So far, this is exactly what the VVI pilot does, but the pilot who believes in descent gradient will use the target 2000 feet per minute only to initially confirm the five degree pitch change.

What's important to the descent gradient pilot is how many feet per mile the aircraft is losing, not what the VVI does. It's very easy to monitor feet loss per mile. All the pilot has to do is glance at the altimeter and the DME. One mile later, check the altimeter again.

In the example, the pilot would check the altimeter and DME, then check for a 500 foot altitude loss (which means the 100 foot pointer would move half way around the dial), after one mile. As long as the airplane has descended at least 500 feet in that mile, the descent is correct. Using this technique, the gradient can be checked throughout various portions of the descent to insure the aircraft continues to lose at least the required 500 feet per nautical mile.

The advantage to this technique is that it works for all types of descents and no math is required. Since the aircraft is usually proceeding either to or from a TACAN, it's a simple matter to check the altitude loss in one nautical mile increments. For enroute descents, the INS/DNS distance display can be substituted for the TACAN DME.

Another advantage to this technique is that descents are made using the primary "control" instrument . . . the attitude indicator. When changes in drag or configuration are made, the descent gradient can be checked/updated by pitch changes on the ADI.

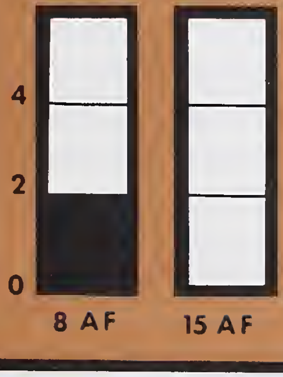
A few months ago, one of my students arrived over the FAF almost 3000 feet too high. He had always held 2500 feet per minute during the descent for this particular approach and had always managed to make it. On this particular day, a 30 knot tailwind for the first half of the approach complicated the descent. Had he checked the descent gradient (which was only 200 feet per nautical mile), he would have known to lower the pitch, since over 500 feet per nautical mile was required. I converted him from a VVI pilot to a descent gradient pilot. He was amazed to learn how easy it was to monitor a descent. Try it. I think you'll be amazed too.

SAC'S TEN YEAR FLYING SAFETY RECORD

CLASS A FLIGHT MISHAPS

YEAR	73	74	75	76	77	78	79	80	81	82	83
TOTAL MISHAPS	5	8	4	4	4	1	5	4	4	2	2
FLYING HOURS 100,000	6.1	5.1	4.2	3.9	3.7	3.6	3.6	3.4	3.5	3.5	1.7
FATALITIES	0	14	7	22	10	5	7	2	14	9	7
RATE	.82	1.6	1.0	1.0	1.1	.28	1.4	1.2	1.2	.58	.65*

*Estimated Rate based on 310,000 Flying Hours



27271

MAY FLYING HOURS

166328

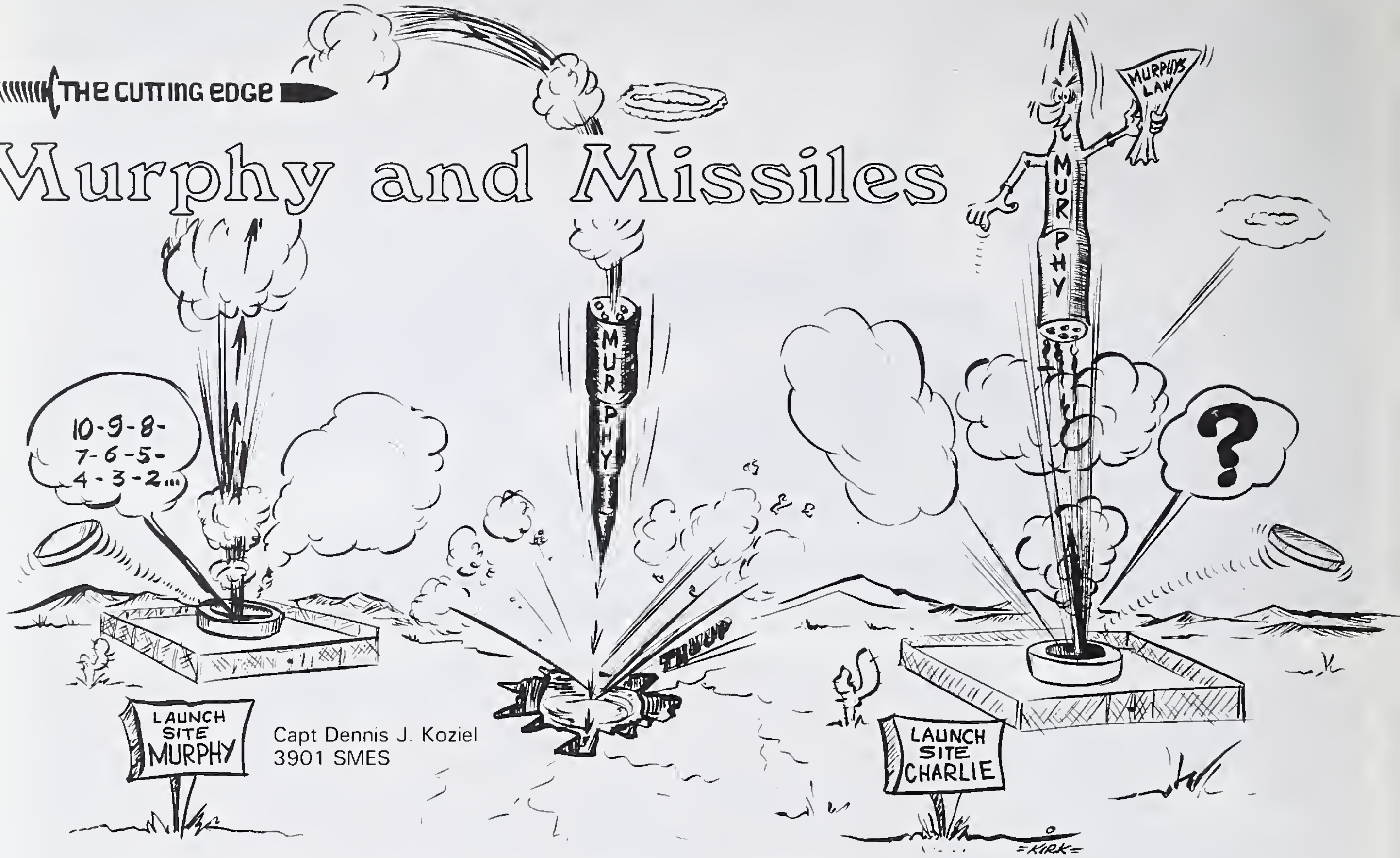
1983 FLYING HOURS

APRIL JUNE	B-52G FB-111A

1983 MISHAP STATS

THE CUTTING EDGE

Murphy and Missiles



Capt Dennis J. Koziel
3901 SMES

The crewmember who busts a check the day before departing on a long awaited confirmed $400 vacation flight is no-notice field checked on the only day in four years he forgets his crew lock. And you can bet your HQ pin that a missile test will never fail nor will a target case ever abort until the SAC IG lands. These and other "**horror stories**" have become part of the folklore of the missile business, where the infinite manifestations of Murphy's Law are a daily occurrence for crewmembers and unit commanders. And what is our reaction? We shrug our shoulders, shake our heads and assign these quirks of fate to the realm of death and taxes. Perhaps instead, we should consider the possibility of using Murphy's Law to benefit rather than hinder the crewmember. In other words, **why be the victims of unfortunate circumstances when we can just as easily benefit from these same circumstances?** We may not be able to completely avoid Murphy's Law, but we can effectively prepare for the consequences.

Let's look at two different types of crewmembers and examine their reactions to the same hypothetical "Murphy's Law" situations. Meet Captain Wallingford Launchworth and Lt Lancelot Laidback. Capt Launchworth (Wally) is your classic, dedicated crewmember. He spends his time war-gaming EWO scenarios, carefully researching his T.O. as he polishes the binder or dutifully practicing access procedures when letting his wife into the basement. Lt Laidback (Lance) is a different breed. Between alerts, he spends hours trying to set up the ultimate staff job that he thinks will get him a below-the-zone promotion to major. He uses his T.O. to hold down all those AF Forms 90 on his desk.

The situations and reactions follow:

Situation 1. Both have an MPT ride scheduled for 0600 hours tomorrow morning and will become delinquent two days later if not evaluated. How do they prepare for the obvious situation?

Wally: Spends the day at DOT and DO22, asking questions and reviewing clarifications and procedures. He spends the night reviewing checklists.

Lance: Left the "Mechanical Bull Disco" at 3:00 a.m. He did stop by the office to pick up his T.O., but then left it in the car and went to bed.

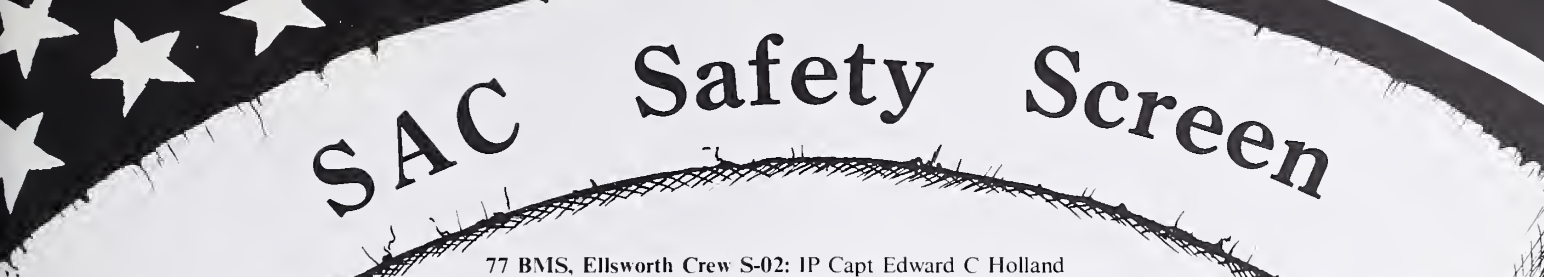
One of these two will avoid the wrath of Murphy's Law while the other will suffer. Which would you be?

Situation 2: Both are on alert and are notified that the SAC IG has just landed. Since Wally and Lance just arrived, they will definitely be the duty crew if the inspector decides to visit the LCF. How do they get ready?

Wally: Notifies all on-site personnel and makes sure they are familiar with the duress word and entry procedures. He then makes sure his crew and capsule/complex are in inspection order. He spends the rest of the time reviewing appropriate ORI procedures and exercise messages.

Lance: He awakes from his nap and tells his deputy to let him know when the inspector is on site. He then rolls over, debating whether or not to request a job interview with the IG when he arrives.

If you were a headquarters evaluator/inspector, where would you go to witness the effects of Murphy's Law?



SAC Safety Screen

77 BMS, Ellsworth Crew S-02: IP Capt Edward C Holland III, CP 1Lt Robert B Thompson, RN Capt Phillip W Howard, IN 1Lt Steven J Borecky, EW Capt William L Calhoun, G SSgt Randy J Kendrick

28 AREFS, Ellsworth Crew R-113: P Capt John H McCartney, CP 2Lt Michael C Poole, IN Maj Joseph M Gregory, N 2Lt Norman M Cortese, BO SSgt Joseph G Gedman

151 AREFG, Salt Lake City (UTANG): IP Maj Paul S Kimmel, IP Lt Col John L Whitten, IN Col Lyle M Rich, IS SMSgt Raymond L Madsen

4 ACCS, Ellsworth Crew R-115P: P Capt David N Range, CP Capt William N Herzog Jr, N Capt Evan H Ashby III, BO SSgt Phillip M Buckner, MCCA Capt Edwin S Watkins, DMCCA Capt John E Babcock, Comm Sys Off Capt Timothy C Martin, Data Op TSgt Shirley A Smith, Rad Op SSgt Phillip A Jones, Rad Op SSgt William E Cadola, Data Op SSgt David C McCoy, Data Op SSgt Michael J Hummel

931 AREFG (AFRES), Grissom Crew: P Capt James L Melin, CP Lt Col John F Harvey, N Capt Norman A Frese, BO SSgt James S Seidle

97 AREFS, Blytheville Crew E-106: P Capt Scott Phillips, CP 1Lt Richard A Busa, N 1Lt Diane Kwiatkowski, BO Sgt James M Boozer

340 BMS, Blytheville Crew R-12: P Capt Terry Bagwell, CP 1Lt Roy Ely, RN Capt Mike Karraker, N 1Lt Timothy Leaptrott, EWO Capt Richard Quinnette, G SSgt Robert McGuirk

340 BMS, Blytheville Crew R-22: P Capt Joseph Culotta, CP Capt Mark Rivas, RN Capt Michael Godbey, N 1Lt Stephen Draper, EWO Capt Robert Kadechka, G SSgt Samuel Brucks

912 AREFS, Robins Crew E-110: P Capt Charles M Seigler, CP 2Lt John H Cook III, N Capt Hal C Hamner, BO TSgt Gary L Ranney

28 BMS, Robins Crew E-23: P Capt James K Bicker, CP 1Lt Charles E Long, RN Capt William K Miehe, N 1Lt Jeffrey Bauer, EWO Capt Scott K Wakefield, G SSgt Walter E Blanchard

28 BMS, Robins Crew R-14: P Capt Dana L Everett, CP 1Lt Daniel J Suarez, CP 1Lt Charles M Evans III, RN Maj Steven E Avery, N 1Lt Mark H Hawks, G SSgt Randall Sanderson

911 AREFS, Seymour Johnson Crew R-104: P Capt Jonathan P Brick, CP 1Lt Stanley H Garrett, N 1Lt David K Meinhart, BO SSgt Albert G Boothby

911 AREFS, Seymour Johnson Crew S-102: P Capt Louis L Descoteaux, CP 1Lt Bradley Bartholomew, N Capt Charles K Frost, BO TSgt Stephen A Sweet

906 AREFS, Minot Crew: IP Maj James O Liabraaten, IP Capt John W Beard, IN Capt Paul B Hamilton, IBO SSgt Ralph L Deibert

93 BMW, Castle Crew R-114: P Capt Alan D Fisher, CP 1Lt Irvin N Bennett, Jr, N Capt Larry Stoltenberg, BO A1C Sean Davies

328 BMS, Castle Crew: IP Maj Thomas G Sullivan, IB Capt Andrew C Skovran, IE Capt Paul L Williams, IS SSgt Michael A Moffatt

126 AREFW, O'Hare (ILANG): P Maj Richard L Jones, P Maj John T Lundy, CP Capt Gerald E Lewis, CP 2Lt David B Weaver, N Maj Robert R Bilik, N 1Lt Richard W Gungel, BO TSgt Roy R Balsamo, BO TSgt John W Kurzeja

351 SMW, Whiteman Crew E-176: MCCC 1Lt William Jones Jr, DMCCC 2Lt Timothy J Linehan III

91 SMW, Minot Crew R-065: MCCC 1Lt Timothy P Trusk, DMCCC 2Lt Michael B Kettering

44 SMW, Ellsworth Crew R-193: MCCC 1Lt Brian M Burgess, DMCCC 1Lt Walter E Loll Jr

341 SMW, Malmstrom Crew E-014: MCCC Capt Robert D Rumbaugh, DMCCC 2Lt Thomas W Billick

351 SMW, Whiteman Crew E-043: MCCC 1Lt Kenneth M Farrell, DMCCC 1Lt Lawrence B Everett

44 SMW, Ellsworth Crew E-053: MCCC 1Lt Richard B Austin IV, DMCCC 2Lt Donald G Manlove

390 SMW, Davis Monthan Crew R-130: MCCC 1Lt Kurt T Mickus, DMCCC 2Lt William McCullough, MSAT SrA Gary L Smith, MFT A1C Lee M Malvin

381 SMW, McConnell Crew E-094: MCCC Capt Alvin N Aromburo, DMCCC 2Lt Mary A Blockmum, MSAT A1C Van S Edwards, MFT SrA Gerald W Boynton

308 SMW, Little Rock Crew R-134: MCCC 1Lt Susan Hanson, DMCCC Capt Juan J Guzman, MSAT SrA Timothy F Homlett, MFT A1C Michael L Spicer

341 SMW, Malmstrom Crew R-173: MCCC 1Lt Mark A Gable, DMCCC 2Lt Larry D Ruebling

44 SMW, Ellsworth Crew R-162: MCCC 1Lt Gregory L Coles, DMCCC 1Lt William S Peterson

90 SMW, F E Warren Crew R-015: MCCC 1Lt Thomas J Edwards, DMCCC 2Lt Daniel E White

91 SMW, Minot Crew E-082: MCCC Capt Scott O Kalbrener, DMCCC 2Lt Joseph F Whaley

321 SMW, Grand Forks Crew S-150: MCCC 1Lt James F Garcia, DMCCC 2Lt Michael D Munro

320 BMW, Mather Crew E-32: P Capt Ronald G Alderman, CP 1Lt Thomas L Cook, RN Capt Paul A Pawlikowski, NN 1Lt James R Pavlisin, EW 2Lt Louis G Ranhofer Jr, AG SSgt Robert K Ratcliffe

320 BMW, Mather Crew E-115: P Maj Robert S Stusnick, CP Capt Randall A Nordhagen, NN Capt Roger M Shweid, BO Sgt Brian E Towle

FLARE

UNIVERSITY OF FLORIDA
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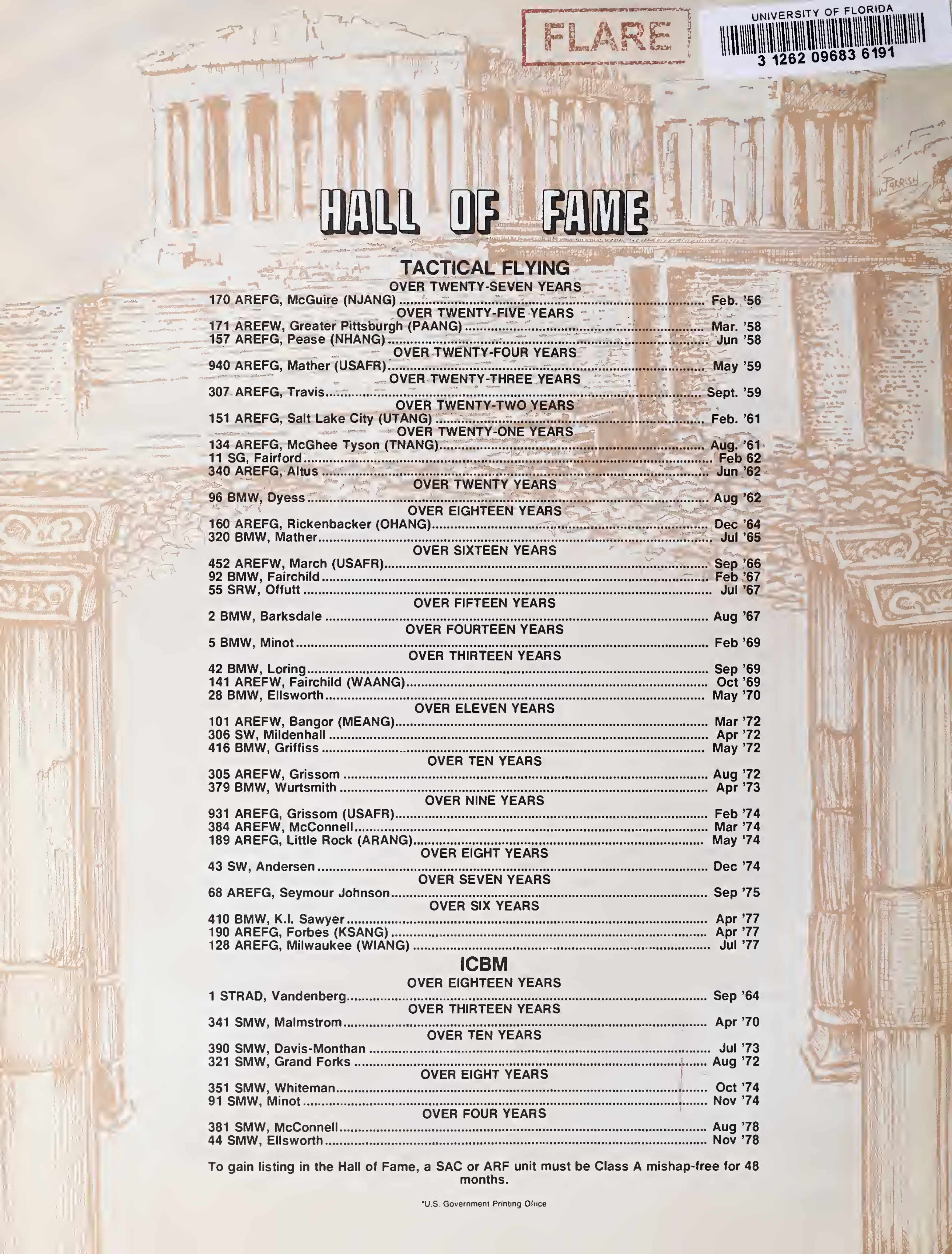

HALL OF FAME

TACTICAL FLYING

OVER TWENTY-SEVEN YEARS	
170 AREFG, McGuire (NJANG)	Feb. '56
OVER TWENTY-FIVE YEARS	
171 AREFW, Greater Pittsburgh (PAANG)	Mar. '58
157 AREFG, Pease (NHANG)	Jun '58
OVER TWENTY-FOUR YEARS	
940 AREFG, Mather (USAFR)	May '59
OVER TWENTY-THREE YEARS	
307 AREFG, Travis	Sept. '59
OVER TWENTY-TWO YEARS	
151 AREFG, Salt Lake City (UTANG)	Feb. '61
OVER TWENTY-ONE YEARS	
134 AREFG, McGhee Tyson (TNANG)	Aug. '61
11 SG, Fairford	Feb 62
340 AREFG, Altus	Jun '62
OVER TWENTY YEARS	
96 BMW, Dyess	Aug '62
OVER EIGHTEEN YEARS	
160 AREFG, Rickenbacker (OHANG)	Dec '64
320 BMW, Mather	Jul '65
OVER SIXTEEN YEARS	
452 AREFW, March (USAFR)	Sep '66
92 BMW, Fairchild	Feb '67
55 SRW, Offutt	Jul '67
OVER FIFTEEN YEARS	
2 BMW, Barksdale	Aug '67
OVER FOURTEEN YEARS	
5 BMW, Minot	Feb '69
OVER THIRTEEN YEARS	
42 BMW, Loring	Sep '69
141 AREFW, Fairchild (WAANG)	Oct '69
28 BMW, Ellsworth	May '70
OVER ELEVEN YEARS	
101 AREFW, Bangor (MEANG)	Mar '72
306 SW, Mildenhall	Apr '72
416 BMW, Griffiss	May '72
OVER TEN YEARS	
305 AREFW, Grissom	Aug '72
379 BMW, Wurtsmith	Apr '73
OVER NINE YEARS	
931 AREFG, Grissom (USAFR)	Feb '74
384 AREFW, McConnell	Mar '74
189 AREFG, Little Rock (ARANG)	May '74
OVER EIGHT YEARS	
43 SW, Andersen	Dec '74
OVER SEVEN YEARS	
68 AREFG, Seymour Johnson	Sep '75
OVER SIX YEARS	
410 BMW, K.I. Sawyer	Apr '77
190 AREFG, Forbes (KSANG)	Apr '77
128 AREFG, Milwaukee (WIANG)	Jul '77

ICBM

OVER EIGHTEEN YEARS	
1 STRAD, Vandenberg	Sep '64
OVER THIRTEEN YEARS	
341 SMW, Malmstrom	Apr '70
OVER TEN YEARS	
390 SMW, Davis-Monthan	Jul '73
321 SMW, Grand Forks	Aug '72
OVER EIGHT YEARS	
351 SMW, Whiteman	Oct '74
91 SMW, Minot	Nov '74
OVER FOUR YEARS	
381 SMW, McConnell	Aug '78
44 SMW, Ellsworth	Nov '78

To gain listing in the Hall of Fame, a SAC or ARF unit must be Class A mishap-free for 48 months.

*U.S. Government Printing Office